Amendments to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application:

1. (previously presented) A method to detect a peak selection error in a waveform, comprising:

a) measuring a first average transit time for one or more ultrasonic signals along a first path in a pipeline;

b) measuring a second average transit time for one or more ultrasonic signals along a second path in said pipeline, said second path being of different length than said first path;

c) determining whether there exists a peak selection error based on the length of said first path, the length of said second path, said first average transit time, and said second average transit time.

2. (previously presented) The method of claim 1, further comprising:

d) computing the size and direction of said peak selection error.

3. (previously presented) The method of claim 1, further comprising:

d) computing the size and direction of said peak selection error;

e) correcting for said peak selection error.

4. (previously presented) The method of claim 1, wherein there exists a peak selection error when a variable η has an absolute value greater than a predetermined value, η being defined according to the equation:

$$\eta = \frac{L_B t_A}{\Delta L} - \frac{L_A t_B}{\Delta L}$$

where,

L_A = length of chord A;

L_B = length of chord B;

t_A = average transit time of ultrasonic signals traveling along chord A (corrected average measured transit time);

t_B = average transit time of ultrasonic signals traveling along chord B (corrected average measured transit time); and

$\Delta L = L_B - L_A$.

5. (previously presented) The method of claim 4, wherein said predetermined value is less than one period of the ultrasonic signal.

6. (previously presented) The method of claim 1, wherein said length of said first path, the length of said second path, said first average transit time, and said second average transit time are used to calculate first and second speeds of sound for a medium in said pipeline, said step of determining whether a peak selection error exists being determined from said first and second speed of sound calculations.

7. (previously presented) The method of claim 4, wherein the direction of said error is indicated by whether η is positive or negative.

8. (previously presented) The method of claim 1, wherein there exists a peak selection error when a variable η has an absolute value greater than a predetermined value, η being defined according to the equation:

$$\eta = \frac{L_B L_A (c_B - c_A)}{\Delta L c_A c_B}$$

where,

η = error indicator

L_A, L_B = lengths of chords A and B;

c_A, c_B - values for speed of sound measured by chords A and B; and

$\Delta L = L_B - L_A$.

9. (previously presented) The method of claim 8, wherein said predetermined value is less than the duration of one period for the ultrasonic signals.

10. (previously presented) An ultrasonic metering system, comprising:

a first transducer pair defining a first ultrasonic path having a first path length;

a second transducer pair defining a second ultrasonic path having a second path length;

one or more processors associated with said first and second transducer pairs, said one or more processors suitable to determine a first average transit time measurement for ultrasonic signals across said first ultrasonic path and a second average transit time measurement for ultrasonic signals across said second ultrasonic path, wherein said processor is programmed to identify simultaneously measurement errors in said first and second transit time measurements.

11. (previously presented) The ultrasonic metering system of claim 10, wherein said processor identifies said measurement errors using said first transit time measurement, said second transit time measurement, said first path length, and said second path length.

12. (previously presented) The ultrasonic metering system of claim 10, wherein said processor is programmed according to the equation:

$$\eta = \frac{L_B t_A}{\Delta L} - \frac{L_A t_B}{\Delta L}$$

where,

L_A = length of chord A;

L_B = length of chord B;

t_A = average transit time of ultrasonic signals traveling along chord A (corrected average measured transit time);

t_B = average transit time of ultrasonic signals traveling along chord B (corrected average measured transit time); and

$\Delta L = L_B - L_A$.

13. (previously presented) The ultrasonic metering system of claim 10, wherein said processor is programmed according to the equation:

$$\eta = \frac{L_B L_A (c_B - c_A)}{\Delta L c_A c_B}$$

where,

η = error indicator

L_A, L_B = lengths of chords A and B;

c_A, c_B - values for speed of sound measured by chords A and B; and

$\Delta L = L_B - L_A$.

14. (previously presented) The ultrasonic metering system of claim 10, wherein said first and second ultrasonic paths reside in part in an ultrasonic meter installed on a pipeline.

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15. (previously presented) The ultrasonic metering system of claim 13, wherein there exists a peak switching error if the absolute value of η is greater than a predetermined value.

16. (currently amended) The ultrasonic metering system of claim 15, wherein said predetermined value is less than a single period of said ultrasonic signals divided by $L/\Delta L$ where L is the length of a chord and ΔL is the difference in lengths of two chords of interest~~,~~.

17. (previously presented) The ultrasonic metering system of claim 11, wherein said processor is programmed according to the equation:

$$\eta = \frac{L_B t_A}{\Delta L} - \frac{L_A t_B}{\Delta L}$$

where,

L_A = length of chord A;

L_B = length of chord B;

t_A = average transit time of ultrasonic signals traveling along chord A (corrected average measured transit time);

t_B = average transit time of ultrasonic signals traveling along chord B (corrected average measured transit time); and

$\Delta L = L_B - L_A$.

18. (previously presented) The ultrasonic metering system of claim 11, wherein said processor is programmed according to the equation:

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$$\eta = \frac{L_B L_A (c_B - c_A)}{\Delta L c_A c_B}$$

where,

η = error indicator

L_A, L_B = lengths of chords A and B;

c_A, c_B - values for speed of sound measured by chords A and B; and

$\Delta L = L_B - L_A$.

19. (previously presented) The ultrasonic metering system of claim 11, wherein said processor computes said measurement errors based on a speed of sound computation and wherein said measurement error is corrected for.

20. (previously presented) A method to determine transit time measurement errors in an ultrasonic meter, comprising:

a) measuring a first average transit time for one or more ultrasonic signals along a first path in a pipeline;

b) measuring a second average transit time for one or more ultrasonic signals along a second path in said pipeline, said second path being of different length than said first path;

c) a step for determining transit time measurement errors in an ultrasonic meter.

21. (currently amended) The method of claim ~~21~~20, further comprising:

d) a step for correcting said measurement errors.

22. (previously presented) An ultrasonic meter comprising:

a first transducer pair to generate and receive a first set of ultrasonic signals;

a second transducer pair to generate and receive a second set of ultrasonic signals;

means for measuring transit times for said first set of ultrasonic signals and said second set of ultrasonic signals;

means for determining transit time measurement errors in said measured transit times for said first set of ultrasonic signals and said second set of ultrasonic signals.

23. (previously presented) The ultrasonic meter of claim 22, further comprising means for correcting for said measurement errors.